West Coast of North America
Living Marine Resources: Digital Atlas

GIS Tool for ArcView 3.x

ABOUT THE ATLAS

The West Coast of North America Data Atlas was the fourth in a set of hardcopy atlases, published by NOAA's strategic assessment program during the late 1980's, covering the major coastal areas of the nation. This series is part of a national program characterizing potential conflicts among users of the U.S. Exclusive Economic Zone (EEZ) and adjacent coastal areas. The goal of the strategic assessment program is to communicate this information to decision makers and public and private institutions involved in resource-use issues.

Two preliminary volumes covering the study area region from the Bering Sea south to the Gulf of California were published. The *Marine Mammal* volume presents information on the spatial and temporal distributions of 33 species. The *Invertebrate and Fish* volume contains 66 species. A map, description, vertical profile, and scale drawing are provided for each species. The map shows important areas by life stage, abundance, time period, and commercial and recreational use. The description is a written summary of scientific knowledge on topics such as life history attributes and catch statistics. For the digital atlas, all 99 species were included in the digitized geographic files.

INITIAL DIGITIZING

Each physical plate (side of a sheet of paper) in the original atlas contains the map for one or more species. In digitizing these plates, the species depicted on each plate were treated separately by assigning a species code to each. In general, these codes follow the order in the atlas index for each section, but this rule is not inviolate. The life history for each species was divided into submaps, each representing presence/absence of a (1) life stage, (2) abundance level, and (3) season (the applicable time of year). Separate data sets were maintained for the northern and southern parts of the maps, because they were separate pieces of paper. Care was taken to do proper edge matching between the pages, but there was no formal check to ensure match. Areas were digitized as priority polygons so they could be clipped by a land mask. Thus, the details of the species polygons over land are arbitrary. The exceptions to this principle are the salmonoid species files (Pink, Chum, Coho, Sockeye, and Chinook Salmon and Steelhead) and the Striped Bass because the adult and spawning life stages for these species have polygons over land showing their occurrences in rivers and streams, which were not digitized, and thus, are not included in this digital atlas.

PROCESSING FOR DIGITAL ATLAS

Source digital arcs and topology were first converted into MapInfo layer files and edited. The species files were joined to their northern and southern halves, if applicable, and clipped to retain only the water portions of the polygons using a 1:2,000,000 land coverage, named 'Land' [wcna_land.shp]. Some additional life stages were added according to the map notes. After edits and additions were complete, the species files were exported to ArcView SHP files. Each file

represents one unique species and is named using a species code (as listed in the tables below). For example, the file name for species 35, Pacific Herring, is 35.shp. Once the files were converted, another quality check was performed on the life history code [LHC] for valid entries. Generally, the species codes were assigned according to the order in which they exist in the original atlas. Thus there is an internal grouping of similar species. Because the adult and spawning life stages of salmonoid species and Striped Bass occur in rivers and streams, these seven species files were clipped to the land boundary, which eliminated these life stages from the digital file.

The following tables identify the species included in the digital atlas, along with their species code:

Table 1. Marine mammals

Code	Common Name	Latin Name
1	Sea Otter	*Enhydra lutris*
2	Northern Fur Seal	*Callorhinus ursinus*
3	Northern Sea Lion	*Eumetopius jubatus*
4	California Sea Lion	*Zalophus californianus*
5	Northern Elephant Seal	*Mirounga angustirostris*
6	Harbor Seal	*Phoca vitulina richardsi*
7	Killer Whale	*Orcinus orca*
8	Northern Right Whale Dolphin	*Lissodelphis borealis*
9	Bottlenose Dolphin	*Tursiops truncatus*
10	Long Beaked Dolphin	*Delphinus delphis*
11	Short Beaked Dolphin	*Delphinus delphis*
12	Pacific White-sided Dolphin	*Lagenorhynchus obliquidens*
13	Short-finned Pilot Whale	*Globicephala macrorhynchus*
14	Harbor Porpoise	*Phocoena phoecoena*
15	Gulf Porpoise	*Phocoena sinus*
16	White Whale	*Delphinapterus leucas*
17	Sperm Whale	*Physeter macrocephales*
18	Cuvier's Beaked Whale	*Ziphius carirostris*
19	Baird's Beaked Whale	*Berardius bairdi*
20	Stejneger's Beaked Whale	*Mesoplodon stejnegeri*
21	Hubb's Beaked Whale	*Mesoplodon carlhubbsi*
22	Gray Whale	*Eschrichtius robustus*
23	Right Whale	*Balaena glacialis*
24	Humpback Whale	*Megaptera novaeangliae*
25	Minke Whale	*Balaenoptera acutorostrata*
26	Sei Whale	*Balaenoptera borealis*
27	Bryde's Whale	*Balaenoptera edeni*
28	Fin Whale	*Balaenoptera physalus*
29	Blue Whale	*Balaenoptera musculus*
30	Risso's Dolphin	*Grampus griseus*
31	False Killer Whale	*Pseudorca crassidens*
32	Dall's Porpoise	*Phocoenoides dalli*
33	Striped Dolphin	*Stenella coeruleoalba*

Table 2. Fishes

Code	Common Name	Latin Name
34	Spiny Dogfish	*Squalus acanthias*
35	Pacific Herring	*Clupea harengus pallasi*
36	Pacific Sardine	*Sardinops sagax*
37	Northern Anchovy	*Engraulis mordax*
38	Pink Salmon	*Oncorhynchus gorbuscha*
39	Chum Salmon	*Oncorhynchus keta*
40	Coho Salmon	*Oncorhynchus kisutch*
41	Sockeye Salmon	*Oncorhynchus nerka*
42	Chinook Salmon	*Oncorhynchus tshawytscha*
43	Steelhead	*Oncorhynchus mykiss*
44	Pacific Cod	*Gadus macrocephalus*
45	Walleye Pollock	*Theragra Chalcogramma*
46	Pacific Hake	*Merluccius productus*
47	Jack Mackerel	*Trachurus symmetricus*
48	Albacore	*Thunnus alalunga*
49	Bluefin Tuna	*Thunnus thynnus*
50	Chub Mackerel	*Scomber japonicus*
51	Kelp Bass	*Paralabrax clathratus*
52	Striped Bass	*Morone saxatilis*
53	Pacific Bonito	*Sarda chiliensis*
54	California Halibut	*Paralichthys californicus*
55	Pacific Baracuda	*Sphyraena argentea*
56	Yellowtail	*Seriola lalandei*
57	Pacific Ocean Perch	*Sebastes aluthus*
58	Widow Rockfish	*Sebastes entomelas*
59	Sablefish	*Anoplopoma fimbria*
60	Lingcod	*Ophiodon elongatus*
61	Atka Mackerel	*Pleurogrammus monopterygiu*
62	Pacific Halibut	*Hippoglossis stenolepis*
63	English Sole	*Parophrys vetulus*
64	Flathead Sole	*Hippoglossoides elassodon*
65	Petrale Sole	*Eopsetta jordani*
66	Starry Flounder	*Platichthys stellatus*
67	Dover Sole	*Microstomus pacificus*
68	Arrowtooth Flounder	*Atheresthes stomias*

Table 3. Invertebrates

Code	Common Name	Latin Name
69	Weathervane Scallop	*Patinopecten caurinus*
70	Pacific Oyster	*Crassostrea gigas*
71	Fat Gaper Clam	*Tresus capax*
72	Pacific Gaper Clam	*Tresus nuttallis*
73	Pacific Razor Clam	*Siliqua patula*
74	California Jackknife Clam	*Tagelus californianus*
75	Pacific Littleneck Clam	*Protothaca staminea*
76	Manila Clam	*Tapes philippinarum*
77	Pismo Clam	*Tivela stultorum*
78	Pacific Geoduck Clam	*Panope abrupta*
79	Pink Abalone	*Haliotis corrugata*
80	Black Abalone	*Haliotis cracherodii*
81	Green Abalone	*Haliotis fulgens*
82	Pinto Abalone	*Haliotis kamtschatkana*
83	Red Abalone	*Haliotis rufescens*
84	White Abalone	*Haliotis sorensoni*
85	Flat Abalone	*Haliotis walallensis*
86	Market Squid	*Loligo opalescens*
87	Red Squid	*Berryteuthis magister*
88	Northern Pink Shrimp	*Pandalus borealis*
89	Ocean Pink Shrimp	*Pandalus jordani*
90	Sidestripe Shrimp	*Pandalopsis dispar*
91	Ridgeback Prawn	*Sicyonia ingentis*
92	Coonstripe Shrimp	*Pandalus hypsinotus*
93	Spot Shrimp	*Pandalus platyceros*
94	Red King Crab	*Paralithodes camtschatica*
95	Blue King Crab	*Paralithodes platypus*
96	Golden King Crab	*Lithodes aequispina*
97	Bairdi Tanner Crab	*Chionoectes bairdi*
98	Dungeness Crab	*Cancer magister*
99	California Spiny Lobster	*Panulirus interruptus*

The life history/abundance code [LHC] has three digits and is generated as the combination of the Life stage code and the Abundance code. The [LHC] is also broken out into separate fields as [Life_stage] and [Abundance] respectively. These fields are used in subsetting the data. For example, a [LHC] value of 101 signifies an adult area in high abundance. The corresponding [Life stage] code is 10 and the [Abundance] code is 1. The following tables define the values for each of the code components (not all life stages are present in the WCNA atlas):

Table 4. Life stage

LHC	Code	Life Stage Description
100	10	Adult Area
110	11	Adult Haulout
120	12	Male Adult Area
130	13	Female Adult Area
150	15	Subadult Area
200	20	Spawning Area
210	21	Calving/Pupping Area
220	22	Nesting/Breeding Area *
230	23	Nesting Colony *
240	24	Rookery *
250	25	Mating Area
260	26	Breeding Area *
270	27	Release of Young Area
280	28	Parental Foraging Area
290	29	Maternal Denning Area *
400	40	Juvenile Area
410	41	Young Juvenile Area
420	42	Older Juvenile Area
600	60	Commercial Fishing/Harvest Area
610	61	Foreign Commercial Fishing Area
700	70	Recreational Fishing Area
800	80	Occurrence *
810	81	Occasional Occurrence *
900	90	Range *
920	92	Stocks

* Not present in digital version of WCNA atlas

Table 5. Relative abundance

Code	Abundance Level	Abundance Level Description
0	1	Average (Area)
1	2	High (Major Area)
2	3	Highest (Major Concentration)

During the GIS operations, all three lookup tables (species_desc.dbf, stage_desc.dbf, and abund_desc.dbf) are linked to the data through the code field [Code] to provide textual names for menu selection.

Seasonality is encoded as a 13-character string [Season], with one character for each month and a 13th character to indicate presence during all months of the year. Any character in the string other than "-" or "blank" indicates the theme is active for that month. The preferred values for each month in sequence are [JFMA5678SONDY]. An internal check, if the 13th character is active (a "Y"), then the preceding 12 characters should also be active.

FOR MORE INFORMATION

For questions regarding the digitization of the data or the application development, please contact Peter L. Grose at (301) 713-3000 x 132 or email: peter.grose@noaa.gov. For questions relating to the West Coast Atlas content, the atlas itself in hardcopy should be consulted, especially the text material on each plate, which expands on the map presentations.

CONTRIBUTORS

Contributors for the digital product include Peter Grose, Holly Baun, Heidi Johnson, Marilyn King, Tracy Gill, and Lisa Butler.

REFERENCES

Strategic Assessment Branch and Northwest and Alaska Fisheries Center, 1990: West Coast of North America Strategic Assessment: Data Atlas. Invertebrate and Fish volume. Pre-publication edition. Rockville, MD: National Oceanic and Atmospheric Administration. 112 pp.

Strategic Assessment Branch and Northwest and Alaska Fisheries Center, 1988: West Coast of North America Strategic Assessment: Data Atlas. Marine Mammals volume. Pre-publication edition. Rockville, MD: National Oceanic and Atmospheric Administration. 58 pp.